AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

ANALYSIS OF THE PRESIDENT'S FISCAL YEAR 2023 BUDGET REQUEST FOR BIOLOGICAL SCIENCES RESEARCH AND EDUCATION

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Prepared by:
Jyotsna Pandey, Ph.D., Director of Public Policy
Julie Palakovich Carr, Policy Consultant

SUMMARY

On March 28, 2022, President Joe Biden released his proposed budget for fiscal year (FY) 2023. The plan would provide $1.7 trillion for discretionary spending, of which $829 billion (+14 percent) would be allocated to nondefense discretionary spending and $813 billion (+4 percent) to defense spending. Non-defense discretionary spending includes funding for the National Science Foundation, National Institutes of Health, and other non-defense agencies.

All federal science agencies would receive budget increases in FY 2023 if the President's budget is enacted. The administration proposes $205 billion for federal research and development, an increase of 28 percent relative to the FY 2021 enacted level. The proposed budget is subject to congressional appropriations.

Congress completed FY 2022 appropriations on March 15, 2022, nearly six months into the fiscal year. Details of program funding for some agencies for FY 2022 were not available during the preparation of this report. This analysis compares budget allocations in the FY 2023 budget request with FY 2022 enacted spending levels for most programs; when FY 2022 data were unavailable, comparisons were made to FY 2021 enacted spending levels.

A PRIMER ON THE FEDERAL BUDGET

Federal spending is broadly categorized as discretionary or mandatory.

Congress determines discretionary spending on an annual basis through the appropriations process. Collectively, twelve pieces of legislation (appropriations bills) fund the federal government—everything from the military to national parks to research.

Discretionary spending limits for various programmatic areas are established by a joint budget resolution adopted by Congress. These levels are informed by the recommendations of authorizing committees and political priorities. Each appropriations subcommittee is provided with a budget threshold within which they must fund the programs under their jurisdiction.

Funding for mandatory programs is controlled by laws outside of the appropriations process. Examples include Social Security, Medicare, and certain agriculture programs.

Mandatory spending has been a growing proportion of the federal budget for decades. Approximately 60 percent of the federal budget is allocated to mandatory spending programs.

PLEASE NOTE:

Only discretionary funding is reported in this document.

Calculations in this report are relative to the FY 2022 enacted level, unless otherwise noted with an *, which denotes a comparison to FY 2021.

AGENCY BUDGET SUMMARIES

United States Department of Agriculture (USDA)

- *Department of Agriculture request: $31.1 billion (+$6 billion)*
- *Research, Education, and Economics request: $4 billion (+$380 million)*

Research programs supported by the USDA would see new funding, especially for research related to climate change.

Intramural agricultural research in the Agricultural Research Service (ARS) would benefit from $1.9 billion in overall funding, an increase of $143 million. A sizable portion of the increased funds are directed to climate science and adaptation research, clean energy research and development, and biotechnology innovation. All eight research divisions within ARS would see increased funding, as would the National Agricultural Library.

The Long-Term Agroecosystem Research (LTAR) Network would have a new coordinated focus on climate change adaptation and mitigation. Additionally, the network would grow with the addition of a new site in Vermont and a new coordinated program among sites in California.

The National Bio and Agro-Defense Facility would see an increase of $48 million for research and operations of this new facility in Kansas, which will study zoonotic diseases that pose a risk to agricultural and public health. An additional $45 million is proposed for capital projects at the Beltsville Agricultural Research Center in Maryland.

The National Institute of Food and Agriculture (NIFA) partners with academic institutions to conduct research, education, and extension activities. NIFA would be funded at $1.8 billion (+12 percent) in FY 2023. Within NIFA, competitively awarded extramural research supported by the Agriculture and Food Research Initiative (AFRI) would receive $564 million (+$119 million). Several research areas would see increased funding, including research on sustainable and resilient agriculture systems in the face of climate change and nutrition research that compliments the Cancer Moonshot. Another area of focus is on 'transformative innovations' at the intersection of agricultural sciences, technology, engineering, and data science that create new products, markets, and jobs; overall, there is an emphasis on emerging technologies in the AFRI budget request.

In terms of education, the Department of Agriculture would invest in capacity building at minority serving institutions with an aim of increasing women and minorities in STEM fields.

USDA Forest Service

- *Forest Service request: $9 billion (+$1.1 billion)*
- *Forest and Rangeland Research request: $317.8 million (+$21.2 million)*

The budget request is a significant increase from recent appropriations for research activities at the Forest Service. The proposed funding, however, is only a little higher than the FY 2010 funding level of $310 million.

Wildfire management and suppression continues to dominate the Forest Service's budget request, with approximately 55 percent of total funding proposed for wildfire activities. Some of the increased funding would support research on hazardous fuel reduction treatments.

Consistent with the Biden Administration's priorities, climate change is a major element of proposed research, with $42 million budgeted for climate-related research and activities, including $5 million for USDA Climate Hubs. Research would be supported to enhance carbon sequestration through ecosystem restoration and reforestation and to inform international climate adaptation and mitigation activities.

Three million dollars in increased funding is proposed for "restoring capacity for foundational research disciplines," such as forest soils, air quality, hydrology, silviculture, genetics, and forest ecology.

The budget provides a flat budget of $22.2 million Forest Inventory and Analysis to maintain the continuous forest census covering all 50 States, which provides critical information for forest management planning. The plan proposes $2.2 billion (+17 percent) for the management of National Forest System lands; $140 million (-12 percent) for Capital Improvement and Maintenance; and $307 million (-3 percent) for State and Private Forestry.

Department of Commerce

National Oceanic and Atmospheric Administration (NOAA)

- *NOAA request: $6.9 billion (+$1 billion)*

Under the President's budget, NOAA would receive $6.9 billion in FY 2023, an increase of 17 percent.

In FY 2023, NOAA will continue to support climate resilience by allocating $350 million to scale up efforts to develop and deliver climate products and services with an emphasis on an earth system approach. The agency will continue to foster environmental stewardship and sustainable economic development with a particular focus on the New Blue Economy, and requests $212 million to support new business development in multiple sectors of the U.S. economy, including fisheries, transportation, shipping, and recreation. Furthermore, an increase of $39 million is requested to advance diversity, equity, and inclusion.

The Office of Oceanic and Atmospheric Research would receive $775 million, a 20 percent increase from the 2022 enacted level. Climate research activities would grow by 28 percent to $257 million. Competitive grants for climate change research would receive a 39 percent boost to $91.5 million. Funding for the Ocean, Coastal, and Great Lakes Research program would remain flat at $237 million. Support for the National Sea Grant College Program, which supports more than 30 American universities that conduct research, education, and training programs on ocean-related topics, would also remain essentially flat at $76 million.

The National Marine Fisheries Service would receive an 8 percent boost in discretionary funding to $1.2 billion. Increases are proposed for Protected Resources Science and Management (+5 percent), Fisheries Science and Management (+11 percent), and Habitat Conservation and Restoration (+12 percent).

The FY 2023 budget proposes a 7 percent boost in funding for the National Ocean Service. Significant increases are proposed for coastal science and assessment (+25 percent) as well as navigation, observations, and positioning (+13 percent). Other programs would slightly shrink or remain essentially flat, including the National Estuarine Research Reserve System (-4 percent), coastal zone management grants (-0.6 percent), coastal zone management and services (+1 percent), and the coral reef program (+1 percent).

The request proposes to expand the Office of Education's budget by 23 percent to $41 million. The office supports STEM education and training activities across NOAA through competitive scholarships, internships, and professional training programs for post-secondary students.

National Institutes of Standards and Technology (NIST)

- *NIST request: $1.5 billion (+$238 million)*
- *Science and Technical Research Services request: $975 million (+$125 million)*

NIST is charged with promoting U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. The agency would receive a 19 percent budget increase, with most going towards expanding its manufacturing programs.

The Scientific and Technical Research Services account would grow by 15 percent. The budget proposes new investments in key national priority areas, including climate and energy (+$20 million*), bioeconomy (+$14 million*), artificial intelligence (+$15 million*), quantum science (+$15 million*), standards for critical and emerging technologies (+$8 million*), circular economy (+$5 million*), and equity and diversity in the workforce ($+6 million*). Laboratory programs, which provide industry, academia, and other federal agencies with research capabilities in measurement science, would receive $727 million (+6 percent*).

The Industrial Technology Services account would grow from $174 million in FY 2022 to $372 million, which translates to a 114 percent budget increase. Major new investments are proposed for its manufacturing programs: Manufacturing USA (+$80 million*) and Manufacturing Extension Partnership (+$124 million*).

The budget proposes a 42 percent cut to the Construction of Research Facilities account, which would receive $120 million for the repair and revitalization of NIST facilities.

Department of Energy (DOE)

DOE Office of Science

- *DOE request: $48.2 billion (+3.1 billion)*
- *Office of Science request: $7.8 billion (+$324 million)*
- *Biological and Environmental Research request: $904 million (+$89 million)*

DOE Office of Science is slated to receive a 4 percent boost in FY 2021. The Office of Science supports both scientific research and design, development, construction, and operation of scientific user facilities. Approximately 29,000 researchers located at over 300 institutions and 17 DOE national laboratories are supported by grants from the Office of Science.

The FY 2023 request proposes increased investments in Administration priorities such as basic research on climate change and clean energy, artificial intelligence, and machine learning, as well as biopreparedness and increasing participation and retention of underrepresented groups in research activities.

Among the Office of Science's six research programs, biological and environmental research would receive the largest boost (+11 percent). The other research programs would receive smaller increases of 5 percent or less.

The $904 million for BER would support enhanced research on climate science, especially through modeling and AI, field sensor development, and studying global carbon carrying capacity of terrestrial ecosystems. Additionally, the agency is continuing planning for a network of climate centers affiliated with Historically Black Colleges or Universities or Minority Serving Institutions.

Notably, BER will participate in the new Funding for Accelerated, Inclusive Research (FAIR) initiative and make targeted investments of $1.9 million to enhance biological research on clean energy, climate, and related topics at Minority Serving Institutions.

In FY 2023, BER will continue a pilot project to study complex coastal estuaries, including the Chesapeake Bay, Puget Sound, and the Great Lakes. Another new initiative would provide the tools and expertise for response to future pandemics and other national emergencies.

Within BER, the 19 percent increase for Biological Systems Science prioritizes core research areas of genomic sciences, such as foundational genomics to modify microorganisms and plants to produce renewable bioenergy, bioproducts, and biomaterials; environmental genomics on understanding soil microbe-plant interactions; and new computational bioscience tools.

The budget for Genomic Science would grow by 22 percent*. In the current fiscal year, the Bioenergy Research Centers will undergo a merit review for a possible 5-year renewal.

The request for Biological Systems Science includes $46.7 million to expand the new Biopreparedness Research Virtual Environment initiative, resulting in a portal for multidisciplinary research collaboration. BER also proposes $50 million to launch Energy Earthshot Research Centers to address key challenges for biological research at the interface of basic and applied research.

The budget would expand funding for all three BER scientific user facilities, namely the Joint Genome Institute (+3 percent), the Atmospheric Radiation Measurement Research Facility (+20 percent*), and the Environmental Molecular Sciences Laboratory (+18 percent*).

Earth and Environmental Systems Sciences—which supports the study of terrestrial ecosystems, including the Arctic—would receive $436 million (+6 percent). Funding increases are slated for all its accounts, including atmospheric systems research (+8 percent*), environmental system science (+45 percent*), earth and environmental systems modeling (+17 percent*), and facilities and infrastructure (+20 percent).

Advanced scientific computing research would receive $1.1 billion, an increase of 3 percent. Increases are proposed for the FAIR initiative (+$4 million) and Quantum Information Science (+$2.8 million). The development of exascale computing would decline by $212 million*.

The budget for basic energy sciences—which supports research in material physics, chemistry, geosciences, and biosciences—would grow by $113 million to $2.4 billion. Continued support is proposed for fundamental energy research, the Energy Frontier Research Centers, two Energy Innovation Hubs, five research centers for nanoscale science, and the National Quantum Information Science Research Centers.

The Science Laboratories Infrastructure account is slated to shrink by 12 percent to $255 million, with the funds directed to 11 ongoing construction projects to improve infrastructure across the national labs.

Workforce development for teachers and scientists would grow by 17 percent to $41 million. The request prioritizes funding for programs that place qualified applicants in STEM learning and research experiences at DOE laboratories and expands training opportunities for students and faculty from underrepresented groups.

Environmental Protection Agency (EPA)

- *EPA request: $11.9 billion (+$2.3 billion)*
- *Science and Technology request: $864 million (+$114 million)*

The President's budget request represents a 24 percent budget increase overall for the EPA. Much of the increase is proposed for rebuilding capacity, including adding 1,900 additional staff and expanding the paid student internship program. The agency lost about 1,000 personnel in recent years.

As with other federal agencies, the EPA's budget request for FY 2023 reflects a strong commitment to tackling climate change. Other cross-agency priority initiatives include chemical risk evaluations—such as on the impacts of pesticides on honey bees, research on and cleanup of PFAS pollution, and community air quality monitoring and notification such as for wildfire smoke.

The Office of Research and Development requested $644 million. The proposed funding level would allow for increased funding for research on air, climate, and energy (+$37.7 million*), including 30 additional staff to tackle climate change and its impacts on human health and ecosystems. Other research programs would see increases: chemical safety (+$8.6 million*), sustainable communities (+$8.5 million*), water resources (+$7.0 million*), and safe drinking water (+2.4 million *).

EPA labs would receive $4.9 million for replacement of aging capital equipment.

The proposed budget will allow for a roughly doubling of evaluations of new active ingredients in pesticides for impacts on threatened and endangered species. Under the Endangered Species Act, the EPA is required to ensure that pesticide regulatory decisions do not adversely impact listed species or their designated habitats.

Water Quality Research and Support Grants, a congressionally directed competitive grant program to support water quality research, would be eliminated. Thirty

million dollars for collaborative climate research would be eliminated due to the creation of the Advanced Research Projects Agency for Climate.

Notably, EPA's budget documents also include a note about agency-wide training on scientific integrity, an issue that plagued the agency under the previous administration.

Department of Health and Human Services

National Institutes of Health (NIH)

- *NIH request: $49 billion (+$3 billion)*

NIH would see its total budget increased by 7 percent to $49 billion.

The request outlines a number of priorities for NIH in FY 2023, including combatting the lasting effects of the COVID-19 pandemic, tackling the opioid epidemic, eradicating HIV in the United States, expanding mental health research, addressing health disparities and inequities, researching the human health impacts of climate change, bolstering the nation's pandemic preparedness, and continuing to support the newly established ARPA-H.

The FY 2023 request includes funding for the new Advanced Research Projects Agency for Health (ARPA-H) to fund high-risk, transformative research that drives biomedical innovations. ARPA-H would see its budget grow from $1 billion in FY 2022 to $5 billion in FY 2023. With $3 billion in new funding slated for NIH overall, and a $4 billion increase requested for ARPA-H, NIH's base budget would shrink by $1 billion, to $44 billion in FY 2023.

Consequently, budgets for most NIH centers would shrink or remain flat:

- National Cancer Institute: -3 percent
- National Heart, Lung, and Blood Institute: +0.4 percent
- National Institute of Neurological Disorders and Stroke: +6 percent
- National Institute of Allergy and Infectious Diseases: -1 percent
- National Institute of General Medical Sciences: +0.2 percent
- National Institute of Environmental Health Sciences: +10 percent
- National Institute of Mental Health: -0.3 percent

- National Human Genome Research Institute: -1.6 percent
- National Institute of Biomedical Imaging and Bioengineering: -1.4 percent
- National Library of Medicine: -1.5 percent

The proposal would cut the Office of the Director's budget by 12 percent. The buildings and facilities account for NIH would see a boost of 20 percent to $300 million, with the increase targeted to addressing the maintenance and repair backlog at the agency. An additional $30 million would be set aside for renovations at the National Cancer Institute's facility in Frederick, Maryland.

To develop an agency-wide approach to building a "solutions-driven climate change and health strategic framework," NIH is proposing a $100 million* increase for research on the human health impacts of climate change. The strategic framework would develop a better understanding of the health impacts and factors that contribute to individual and community susceptibility, strengthen capacity for research and transdisciplinary workforce development, and advance community-engaged research.

NIH proposes an increase of $350 million above FY 2022 to accelerate health disparities and inequities research, including $210 million for the National Institute on Minority Health and Health Disparities. NIH will continue to support the agency-wide UNITE Initiative that was launched in early 2021 to end racial inequities across the biomedical research enterprise. Furthermore, the request includes an increase of $16 million* for the Chief Officer for Scientific Workforce Diversity to enhance NIH's effort to diversify the national scientific workforce and expand recruitment and retention.

The budget for NIH includes $1.1 billion (+119 percent) in funding made available through the 21st Century Cures Act, with $216 million allocated for the National Cancer Institute, $225 million for the National Institute of Neurological Disorders and Stroke, $225 million for the National Institute of Mental Health, and $419 million for the Innovation Account. The request includes $260 million (+$15 million) for the development of a universal influenza vaccine and $26 million for the NIH-sponsored Centers for AIDS Research to continue research on HIV prevention and treatment.

The agency requests $2.6 billion for opioids, stimulants, and pain research. Within this total, $1.8 billion would support ongoing research across NIH, while $811 million would be allocated to the Helping to End Addiction Long-term (HEAL) Initiative, which was launched in April 2018 to combat opioid addiction and perform research on pain and addiction.

The proposal includes targeted increases for the National Institute of Mental Health to expand research on the impact of the COVID-19 pandemic on mental health (+$25 million*), to support studies on the impact of social media on mental health (+$5 million*), and to fund research to inform mental health treatment approaches (+$5 million*). NIH also requests $2 million to establish a center for ongoing sexual orientation and gender identity research.

Department of the Interior

United States Bureau of Land Management (BLM)

- *BLM request: $1.6 billion (+$140 million)*
- *Management of Lands and Resources request: $1.4 billion (+$146 million)*

The modest increase requested for BLM would support investments to address climate change and to improve the health and resilience of public lands.

Cultural Resources Management, which includes archeology and collections management, would be funded at $21.4 million, an increase of 9.2 percent from the FY 2021 appropriation.

Wildlife and Aquatic Habitat Management is budgeted at $239 .1 million. Included in this request is funding for an initiative to supply native plants and seeds for use in large-scale restoration projects. Other proposed activities include control of aquatic invasive species and identification and protection of seasonal habitats to improve habitat connectivity.

BLM would be part of the establishment of a Civilian Climate Corps to train young adults and veterans to manage natural resources and improve public lands. As with other Administration initiatives, this endeavor is planned as a way to develop the federal government's future workforce.

United States Fish and Wildlife Service (USFWS)

- *USFWS request: $2.1 billion (+$416 million)*

The proposed budget includes a 25 percent overall increase for the U.S. Fish and Wildlife Service. The USFWS is the federal agency responsible for management of the nation's biological resources. It protects endangered species, migratory birds, marine mammals, and other fish and wildlife species.

Although much of the agency's work is focused on conservation, the Science Support program provides scientific information to government and non-government entities working collaboratively on conservation projects, especially regarding climate impacts. The 2023 request for Science Support is $38.5 million, which would more than double the program's funding relative to FY 2021 appropriations.

Planned scientific activities include building technical capacity in geospatial mapping and social sciences to further collaborations on climate stressors, coastal resilience, mitigating desertification, controlling invasive species, and reducing the prevalence and magnitude of wildfires. Pollinator science and internships in conservation science would also be expanded.

For Ecological Services, the budget includes $356 .2 million for conservation of at-risk species and habitats. Increased funding is also proposed to accelerate completion of five-year species status reviews.

A proposed $2.6 million would establish an aquatic invasive species rapid response initiative.

Among USFWS' international programs is an investigation of the human drivers of wildlife disease transmission.

United States Geological Survey (USGS)

- *USGS request: $1.7 billion (+$317 million)*
- *USGS Ecosystems Activity request: $376 million (+$98 million)*

The budget for the USGS would be augmented by 23 percent. Funding increases are proposed for USGS programs across the board.

The Ecosystems Mission Area—the primary biological science organization of the Department of the Interior—provides the science needed to achieve sustainable management and conservation of biological resources in wild and urban spaces. The Ecosystems account, which also includes Environmental Health programs, Land

Change Science, and the Climate Adaptation Science Centers, would receive $376 million in FY 2023 (+35 percent).

Other mission areas are also slated for budget increases. Water Resources would receive a nearly 6 percent increase to $303 million, with the Water Resources Research Act program growing by $4 million to $15 million. Support for Natural Hazards would increase by 18 percent. This includes programs to monitor earthquakes (+11 percent) and volcanoes (+4 percent). The plan would provide $125 million (+16 percent) for the National Land Imaging Program, including $92.3 million to support the Landsat 7, 8, and 9 satellite ground and flight operations and continue developing sustainable land imaging with Landsat Next, in partnership with the National Aeronautics and Space Administration.

Core Science Systems is slated to receive $349 million in FY 2023, a 32 percent boost. Most of the new funding would go to the Science Synthesis, Analysis, and Research (SSAR) Program, which would be funded at $84 million (+221 percent), of which $30 million would be set aside for a collaborative climate innovation response and resilience framework. The request for SSAR includes $25.5 million to lead the development of the Administration's American Conservation and Stewardship Atlas, a tool that will deliver science to inform conservation for the America the Beautiful initiative. The Atlas will support conservation, stewardship, and restoration activities and provide the data needed to achieve the Administration's goal of conserving 30 percent of America's lands and waters by 2030.

The Energy and Mineral Resources Mission Area is looking at a significant increase of 54 percent. Science Support programs at USGS would receive a 30 percent increase, while the Facilities account would get a 2 percent increase.

All research programs are slated for budget increases relative to FY 2022, including species management research (+35 percent), biological threats and invasive species research (+19 percent), land management research (+25 percent), environmental health research (+5 percent), and water use and availability science (+$12 percent).

Cooperative Research Units (CRUs), which are located on 40 university campuses in 38 states, would see their budgets grow by 8 percent to $28 million. The CRUs allow USGS to leverage research and technical expertise affiliated with these universities to conduct research, provide technical assistance, and develop scientific workforces through graduate education and mentoring programs.

Major investments are once again proposed for climate research. The National and Regional Climate Adaptation Science Centers are slated for a 65 percent ($34 million)

increase in budget, with $8.5 million in new funding set aside for Tribal Climate Adaptation Science. The Climate Adaptation Science Centers are responsible for developing the science and tools to address the effects of climate change on land, water, wildlife, fish, ecosystems, and communities. The Land Change Science account would nearly double to $39 million.

The proposal again includes $5 million in funding—split equally between the Climate Adaptation Science Centers and the SSAR accounts—for a new program: Assessment of Biodiversity. This program would understand the key linkages between climate change and biodiversity, develop scientific approaches to help reverse the decline of biodiversity, and conduct the first National Assessment of Biodiversity and Ecosystems.

Other new climate-related investments include $5 million for research on climate-driven biological threats and invasive species, $4 million to improve resilience to coastal hazards, $10 million to model and forecast coastal hazards, and $4 million for research on coastal blue carbon sequestration. The budget also proposes a $10 million increase to support the inventory of greenhouse gases and a $5 million increase to provide decision tools to support clean energy deployment.

National Science Foundation (NSF)

- *NSF request: $10.5 billion (+$1.7 billion)*
- *Research and Related Activities request: $8.4 billion (+$1.3 billion)*
- *Major Research Equipment and Facilities Construction request: $187 million (-$62 million)*
- *Education and Human Resources request: $1.4 billion (+$371 million)*
- *Biological Sciences Directorate request: $970 million (+$152 million*)*

The President's budget request would increase NSF's funding by 20 percent. This is a significant boost of $1.7 billion for the science agency.

The request includes $880 million for a new commercialization-focused directorate—the Technology, Innovation, and Partnerships (TIP) Directorate—to help translate research into practical applications. About a quarter of the proposed funding would support up to 10 NSF Regional Innovation Engines to create "regional-scale innovation ecosystems" and address regional workforce and economic needs. An additional $2.1 billion is requested to support investments in "emerging industries for U.S. competitiveness" that include advanced

manufacturing, advanced wireless, artificial intelligence, biotechnology, microelectronics, semiconductors, and quantum information science.

Across NSF, $1.5 billion is requested to support a broad portfolio of research related to climate science and clean energy. This research portfolio would include water and carbon cycles, modeling climate systems, renewable energy technologies, materials sciences, the impacts of global change on the Arctic region, and social, behavioral, and economic research on human responses to climate change.

NSF will continue to invest in its Big Ideas initiative, including Understanding the Rules of Life ($94 million), Navigating the New Arctic ($35 million), and Harnessing the Data Revolution ($182 million), among others.

Overall, the Research and Related Activities account would be augmented by 18 percent to $8.4 billion in FY 2023. All research directorates would see growth in their funding compared to FY 2021:

- Biological Sciences Directorate: $970 million (+19 percent)
- Computer and Information Science and Engineering Directorate: $1.2 billion (+14 percent)
- Engineering Directorate: $940 million (+23 percent)
- Geological Sciences Directorate: $1.2 billion (+23 percent)
- Mathematical and Physical Sciences Directorate: $1.75 billion (+10 percent)
- Social, Behavioral and Economic Sciences Directorate: $330 million (+17 percent)
- Technology, Innovation, and Partnerships Directorate: $880 million (+139 percent)
- Office of International Science and Engineering: $74 million (+44 percent)
- Office of Polar Programs: $547 million (+13 percent)
- Integrative Activities: $546 million (+41 percent)

NSF proposes changing the name of the Directorate for Education and Human Resources to the Directorate for STEM Education (EDU). In FY 2023, EDU would operate at $1.4 billion (+37 percent). Within EDU, the Division of Undergraduate Education would see its budget increase by nearly 7 percent, while the Division of Graduate Education would receive a 23 percent boost*. Notably, the number of new graduate research fellowships would rise from 2,000 to 2,750 and fellowship annual stipends would increase by $3,000. EDU would also invest $9 million in biotechnology through research and workforce development programs. Funding for the NSF Research Traineeship program would increase by 8 percent to $63 million.

The agency also requests $393 million for programs to advance equity in science and engineering by broadening participation from underrepresented groups. NSF INCLUDES, which supports education and career pathways to help build a diverse and skilled American STEM workforce, would get $50.5 million. An additional $247 million is proposed to support EPSCoR, which aims to enhance research competitiveness of targeted jurisdictions by strengthening STEM capacity.

Budget requests for cross-cutting programs are mixed. The Long-Term Ecological Research (LTER) network is slated to receive $34 million, a 6 percent* increase. However, the Research Experiences for Undergraduates program would be cut by 1.5 percent* and support for faculty early career development programs and CAREER grants would be cut by 24 percent*.

The NSF Innovation Corps, which improves researchers' access to resources that help transfer knowledge to downstream technological applications, would receive flat funding of $40 million.

The Major Research Equipment and Facilities Construction account would receive $187 million in FY 2023, a 25 percent decrease. This account supports continued construction of four ongoing major facility projects, including long-term upgrades of NSF's major Antarctic infrastructure.

NSF's Biological Sciences Directorate

Overall, the BIO directorate is slated for a 19 percent* increase. BIO provides about 65 percent of federal funding for basic non-medical biological research at academic institutions.

Within BIO, funding would be allocated to each of its five divisions as follows (compared to FY 2021):

- Biological Infrastructure: $221 million (+33 percent)
- Environmental Biology: $186 million (+4 percent)
- Integrative Organismal Systems: $214 million (+4 percent)
- Molecular and Cellular Biosciences: $162 million (+4 percent)
- Emerging Frontiers: $186 million (+70 percent)

Both the number of grants awarded and the median award size are proposed to increase. The funding rate for BIO research grants is expected to increase from 28

percent in FY 2021 to 29 percent in FY 2023; this figure does not include the pre-proposal review process.

The FY 2023 request for BIO aligns with a number of Administration priorities, including biotechnology, climate change, and infectious diseases. Overall, $392 million (+$17 percent*) is proposed for research related to the bioeconomy, with one-third of funding coming from BIO and the remainder from other NSF directorates.

BIO would once again prioritize investments in climate change, by increasing support for research to "understand the critical feedbacks between Earth's biota and the climate system" and to improve predictive models for how climate change will impact critical ecosystems and human communities in urban and rural areas. BIO would also support research to advance clean energy biotechnologies and practices through fundamental research in systems and synthetic biology, plant genomics, and ecosystem sciences.

Other major BIO investments include stewardship for Understanding the Rules of Life, advanced manufacturing, artificial intelligence, quantum information sciences (QIS), improving undergraduate STEM education, and broadening the participation of underrepresented groups in Postdoctoral Research Fellowships in Biology.

Other programs that would benefit from increased funding include the Integrative Biology program, which promotes ambitious, high-risk/high-reward collaborative research, and the Biology Integration Institutes program, which supports collaborative research on frontier questions about life that span multiple disciplines within and beyond biology.

The National Ecological Observatory Network (NEON) would receive $70 million (+$5 million*). NSF requests $5 million for Centers for Analysis and Synthesis, including $3 million in continued support for a new center in environmental science and eco-forecasting that will leverage data being provided by NEON, LTER, and other environmental observatories and databases to support community efforts in ecological modeling and forecasting.

Smithsonian Institution

- *Smithsonian Institution request: $1.2 billion (+$112 million)*

Federal support for the Smithsonian Institution would grow by 11 percent. This increase includes the congressionally mandated pay raise, funds to revitalize physical infrastructure, and support for two new museums. Smithsonian is also funded by private donations and a trust fund.

The Facilities Capital account would receive $265 million (+26 percent), including $23 million to continue the major renovation project at the National Air and Space Museum; $20.4 million for the National Zoo's ongoing revitalization work; $5.9 million for the Smithsonian Environmental Research Center; $8.4 million for the Smithsonian Tropical Research Institute; $8 million for the Suitland Collections Center; and $55 million for ongoing renovations at the Smithsonian Institution Building. Funds are also included for the continued planning and design for the two new congressionally-mandated museums: the National Museum of the American Latino and the Smithsonian American Women's History Museum.

Funding for the preservation of collections would increase by 10 percent to $83.5 million. The request includes an increase of $1.9 million* for collections support to rebuild curatorial and collections management staffing and support collections research at the Smithsonian Institution. According to the budget proposal, these additional staff are needed to assist museums with research and public collections inquiries, expanding loan and digitization capacities to meet the growing demand for physical and digital access to collections, and conserving at-risk collections, among other things.

Interdisciplinary research programs at the Smithsonian Institution are slated to receive an increase of $10 million*. Of that increase, $5 million would be targeted to biodiversity research, including increased support for climate change coordination and monitoring (+$1 million*), research data management efforts (+$1 million*), and the Global Earth Observatory (GEO) networks (+$3 million*). The mission of the GEO networks is to accelerate understanding of the diversity and functioning of forest and marine ecosystems to predict their futures. The remaining $5 million in new interdisciplinary research funding would be set aside to respond to unique research opportunities (e.g. research on One Health, biodiversity genomics, endangered and invasive species, and climate change impacts) and to recruit and retain a diverse STEM workforce.

Funding increases are proposed for most ongoing activities at Smithsonian, including public programs for dissemination of information (+$3 million*), exhibitions (+$4.6 million*), and educational outreach (+$2 million*).

The National Museum for Natural History would receive $15.3 million to continue major revitalization work and $55.2 million (+3.4 percent) for salary-related costs for existing staff. An additional $567,000 and three new permanent collections staff would advance the digitization of biological, cultural, and geological collections and collections data and make them more accessible for research. Specifically, the new positions will lead mass-digitization efforts for "difficult-to-digitize, fluid-preserved invertebrate animals and pinned insects;" transform analog data; perform data cleaning and standardization; build data science tools to enable big data initiatives; and provide educational resources for schools. Notably, digitization of collections data that contributes to understanding climate and environmental changes would be prioritized.

The Smithsonian Tropical Research Institute, which works towards understanding the biological and cultural diversity in the tropics, would receive a slight boost of 3.4 percent to $16.2 million. The Smithsonian Environmental Research Center conducts research on land and water ecosystems in the coastal zone and would receive $4.9 million (+3.7 percent). This center will continue to collaborate with the National Ecological Observatory Network and serve as a key partner in the development of the MarineGEO initiative, which tracks changes in near-shore marine ecosystems.

WHAT'S NEXT?

The President's budget request is only a proposal; it does not have binding authority. Congress uses the President's budget request as a starting point for their budget negotiations. Congress has already begun their consideration of the FY 2023 budget, although it will be several months before any final decisions are made.

ABOUT AIBS

The American Institute of Biological Sciences is the national scientific organization dedicated to advancing the biological sciences to promote an increased understanding of all life. Our mission is to promote the use of scientific information to inform decision making and advance biology for the benefit of science and society.

AIBS initiatives are unified by a commitment to promoting informed decision-making. Our strategic priorities include:

- **Publications and Communications** including reliable reports, analyses, and the peer-reviewed journal *BioScience*, which is a forum for integrating the life sciences and educating the public about biological sciences.
- **Scientific Peer Advisory and Review Services** for research proposals and programs sponsored by funding organizations, including the federal government, state agencies, private research foundations, and other non-government organizations, and to educate the community about the science of peer review.
- **Community Programs** that advance the field and profession of biology while promoting and providing leadership, with a particular emphasis on public policy and advocacy, education and professional development, as well as public awareness of science.

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